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ABSTRACT

The paper describes the type of computer access products appropriate for use by handicapped children and presents a systematic procedure for selection of such input and output devices. Modification of computer input is accomplished by three strategies: modifying the keyboard, adding alternative keyboards, and attaching switches to the keyboard. Popular products for modifying the keyboard are keyguards, keylocks, and repeat defeats. Alternative keyboards may be either transparent (allows use of standard software--e.g., "Unicorn Expanded Keyboard," "Mini-Membrane Keyboard," "Mini-Keyboard," and non-transparent (requires specially designed software--e.g., "Muppet Learning Keys," "Power Pad," "TouchWindow"). Attached switches are appropriate for students for whom the previous modifications are not sufficient. Products include "Ablenet Switch 100," "Lever Switch," "P-Switch," and "Tread Switch." The preferred output strategy maintains the monitor and printer as the primary visual output device. If this is not feasible, speech synthesis should be considered. (DB)

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ALTERNATIVE COMPUTER ACCESS FOR YOUNG HANDICAPPED CHILDREN A SYSTEMATIC SELECTION PROCEDURE

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Introduction

The increasing use of microcomputers with special education pupils has brought with it academic opportunities for some but has raised yet another barrier for pupils with physical, cognitive or visual handicaps. Modifications are needed for pupils who can not push the keys on the keyboard, select the appropriate key to use, or see the information displayed on the monitor. A number of products exist which modify the computer and allow a handicapped child access in a manner similar to non-handicapped peers. Many are simple low cost products that can easily attach to the computer.

Difficulty in computer access lies in two areas -- entering information through the keyboard (input) and receiving information from the monitor (output). Input is a problem for individuals with physical handicaps or cognitive disabilities. Output is a problem for individuals who are visually impaired, blind or cognitively impaired. This paper outlines a selection procedure and describes products necessary for making informed decision on computer access using input or output devices appropriate for young handicapped pupils.

The objectives of this paper are to:

(1) Provide educators with a systematic procedure for selection of appropriate access devices.

(2) Acquaint educators of handicapped children with types of computer access products currently on the market.

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Strategies for Selecting Access Devices

In an educational setting with young children, three strategies exist for modifying computer input:

* modifying the keyboard;
* adding alternative keyboards; and
* attaching switches to the computer.

Voice and light input are viable options for the future but are seldom used with educational software for young children.

Strategies for modifying output are:

* enlarging the image on the monitor; and
* using speech synthesis.

Specialized braille printers and tactile devices are also available, however, they are expensive and more functional for the advanced student.

An appropriate computer modification procedure will give highest priority to strategies which provide the least restrictive solution, that is, strategies that deviate the least from standard computer functioning. Because of its design, the standard means of using the computer is through the keyboard. For this reason, the first input strategy should be equipment or techniques which modify the keyboard but still maintain its integrity as the standard input device. If using the keyboard is not feasible, the second and third strategy of attaching alternative keyboards or using switches should be considered in order. The first output strategy is one which maintains the monitor and printer as the primary visual output device. If this is not feasible, speech synthesis should be considered.

The information below lists some of the most popular input hardware available. These products have been selected because they:

* are readily available;
* are durable;
* have good product support;
* are popular in special education classrooms;
* support software that is academically relevant; and
* are reasonably priced.

Input Hardware

Modifying the Keyboard

The first strategy is to determine if the child can use the computer keyboard if minor modifications are made. This strategy is appropriate when the child can use the keyboard but slowly and with difficulty. These modifications can be made by repositioning of the keyboard, by using adaptive equipment, or by using products to alter the keyboard. These products are most often used to reduce frustration or increase rate when using the computer.

Three popular products to modifying the keyboard are keyguards, keylocks and repeat defeats.

Keyguard

A keyguard is a keyboard shield with holes over the key positions. This shield prevents unintentional activation of more than one key at a time and allows users to stabilize their hand while activating the keys. A keyguard attaches to the computer

with velcro.
Prentke Romich Company, Adaptive Communication Systems, or Computability Corporation ($24.95-$107.00)

Keylock

A keylock is a latching device designed to hold down the ESC, CONTROL, SHIFT or other keys. Keylocks allow a one-handed or single finger typist to toggle these keys on and off. Keylocks attach to the edge of the computer or to a keyguard.
TASH, Inc., Adaptive Technology, or Extensions for Independence ($10.00-$44.00)

Repeat Defeat

Repeat Defeat is a hardware modification that disables the auto-repeat function. It allows users to type slowly without inadvertently activating the repeat on each keystroke. It is installed in the keyboard circuit socket.
Life Science Associates ($29.95)

Adding Alternative Keyboards

Adding alternative keyboards is the second strategy. Alternative keyboards ignore the standard keyboard and provides an additional keyboard which may be more appropriate in size, layout and complexity. Alternative keyboards fall into two major classifications: transparent and non-transparent. Transparent keyboards attach to a keyboard emulator and will operate with most software designed to be operated from the keyboard. Non-transparent keyboards connect to the game port and operate with software designed specifically for the keyboard.

Transparent Keyboards

Unicorn Expanded Keyboard

The Unicorn Expanded Keyboard is a touch sensitive keyboard designed to be customized into a variety of keyboard layouts. This customization can make keys larger or position keys within optimal reach. It must be used with a keyboard emulation interface.

Unicorn Engineering, Don Johnston Developmental Equipment, or TASH, Inc. ($295.00-$385.00)

Mini-Membrane Keyboard

The Mini-Membrane Keyboard is a small programmable keyboard which measures only 7"x4.75". This small keyboard can be easily customized and positioned for individuals with a unique or limited range of motion. Proper interface is required.

Don Johnston Developmental Equipment ($149.95)

Mini-Keyboard

The Mini-Keyboard is a small keyboard with the most used letters in the center. It is designed for individuals with a small range of motion and can be activated by finger, pointer, or splint. It must be used with a keyboard emulation interface.

TASH, Inc. or Don Johnston Developmental Equipment. ($204.00-$360.00)

Non-Transparent Keyboards

Muppet Learning Keys

Muppet Learning Keys is an enlarged keyboard with letters,

colors, numbers, and function keys designed to be appealing and logical to young children. It will work only with special software designed for this age group. The keyboard attaches to the computer through the game port.

Sunburst Communications ($79.95)

Power Pad

The Power Pad is a touch sensitive keyboard which allows a variety of key configurations depending upon the software used. Overlays included with the software designate the key configuration for a number of communication and academic programs. The Power Pad attaches to the computer through the internal game port socket.

Dunamis, Inc. or Don Johnston Developmental Equipment ($99.95-$119.90)

TouchWindow

The TouchWindow is a transparent screen which attaches to the computer monitor with velcro. It allows the student to use a finger or pointer to select choices or draw on the computer screen. This screen connects to the computer through the game port.

Edmark Corporation, Don Johnston Developmental Equipment, or Computability Corporation ($199.95-$229.95)

Attaching Switches

A final input strategy is adding switches to the computer. Switches should be considered only for students who cannot successfully access the computer by the two strategies above.

All switches can be either transparent or nontransparent. Switches which operate transparently must be connected to a keyboard emulator such as the Adaptive Firmware Card.

Ablenet Switch 100

The Ablenet Switch is a general purpose touch switch. Its 5" diameter, bright red color and audible click makes it an appealing switch for young children.

Ablenet ($29.95)

Lever Switch

The Lever Switch is activated by pushing against a lever. Often this lever is padded on one end and mounted as a head switch on wheelchairs.

Zygo Industries, Inc. ($39.00)

P-Switch

The P-Switch is a small sensitive electronic switch the size of a button. Its small size and electronic sensitivity makes it useful when small muscle movement is needed to activate the switch.

Prentke Romich Company ($170.00)

Tread Switch

The Tread Switch is activated by pushing down on a top plate. The audible click and sturdy construction makes this useful for hand or foot operation.

Zygo Industries, Inc. ($39.00)

Resources

Ablenet
AccessAbility, Inc.
360 Hoover Street, N.E.
Minneapolis, MN 55413
612-331-5958

Adaptive Communications Systems
994 Broadhead Road, Suite 202
Coraopolis, PA 15108
412-264-2288

Adaptive Technology
5334 72nd Circle N.
Brooklyn Center, MN 55429
612-560-0861

Computability Corporation
101 Route 46 East
Pine Brook, NJ 07058
201-882-0171

Don Johnston Develop. Equip.
900 Winnetka Terrace
Lake Zurich, IL 60047
312-438-347

Sunburst Communications
39 Washington Avenue
Pleasantville, NY 10570
800-431-1934

Unicorn Engineering Company
6201 Harwood Avenue
Oakland, CA 94618
415-428-1626

Dunamis, Inc.
2856 Buford Highway
Dulath, GA 30136
404-476-4934

Edmark Corporation
P.O. Box 3903
Bellevue, WA 98009
800-426-0856

Extensions for Indep.
635-5 N. Twin Oaks Rd.
Marcos, CA 92069
619-744-4083

Life Science Associates
One Fenimore Road
Bayport, NY 11705
516-472-2111

Prentke Romich Company
1022 Heyl Road
Wooster, OH 44691
216-262-1984

TASH, Inc.
70 Gibson Drive, Unit 12
Markham, Ontario
Canada L3R 4C2
416-475-2212

Zygo Industries, Inc.
P.O. Box 1008
Portland, OR 97207
503-297-1724

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